

Friction of a Shoe Lab

CP Physics

26 Points Total

The goal of this lab is to determine the static and kinetic coefficients of friction of a shoe.

Materials: Shoe, spring scales with various measuring scales.

Instructions:

1. Measure the weight of the shoe with a spring scale.
2. Place the shoe on the table and attach a spring scale to it so that the scale is parallel with the table.
3. Pull on the spring scale until the shoe begins to move. The force where it begins to move is the maximum applied force. Repeat measurement three more times so that there is a total of four force measurements.
4. Use Newton's second law and the friction equation to solve for the coefficient of static friction.
5. For the coefficient of kinetic friction experiment, pull the shoe horizontally at a constant velocity. This will make the problem an equilibrium problem, which will simplify the calculations.
6. The force measured by the spring scale is the applied force, and this will be used in the calculations for the coefficient of kinetic friction. Perform the measurements a total of four times.

Rubric:

1. Procedure (3 points).
2. Drawing of each setup (2 points; 1 for each).
3. Free-body diagram of shoe (2 points).
4. Table with force measurements, with their values for each trial, from both experiments (3 points).
5. Calculation of coefficient of static friction (4 points) and coefficient of kinetic friction (4 points). [Refer to your notes for the calculations.]
6. Sources of error and ways to minimize the sources of error (4 points; 2 each).
7. Conclusion sentences (4 points). Discuss which coefficient of friction has a higher value, and why.